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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/994,447	11/27/2001	Stephen Francis Bush	14875	9513

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EXAMINER	
FERRIS III, FRED O	
ART UNIT	**PAPER NUMBER**
2128	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/994,447	Applicant(s) BUSH, STEPHEN FRANCIS	
	Examiner Fred Ferris	Art Unit 2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 29 September 2005.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-8 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-8 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 27 November 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-8 have been presented for examination based on applicant's amendment filed 29 September 2005. Claims 1-8 remain rejected by the examiner.

Response to Arguments

2. Applicant's arguments filed 29 September 2005 have been fully considered.

Regarding applicant's response to objection to the specification: The examiner withdraws the objection to the specification in view of applicant's amendment the specification.

Regarding applicant's response to 35 USC 101 rejection: The examiner withdraws the 101 rejection of claims 1-7 as being tangibly embodied by reciting encoding the optimized command sequence in and active (network) packet. However, claim 8 remains rejected under 101 as not providing a concrete and tangible result. (See: 101 rejection below)

Regarding applicant's response to 103(a) rejections: The main thrust of applicant's arguments are drawn to arguing that Draper does not disclose an "active packet", and that the examiner has improperly relied on inherency in making the prior art rejection. In response the examiner submits that these arguments are non-persuasive for the following reasons. First, the rejection is based on obviousness, not anticipation, and the examiner has not relied on inherency in formulating his rejection reasoning. Draper clearly teaches the use of state-of-the-art network technologies (Java Socket, CORBA, and the Internet, pp. 746, para: 2) for communication in a simulated

UAV environment. It is well established that such network technologies communicate via data "packets". (See: "packet", Microsoft Computer Dictionary). Second, looking into applicant's specification for guidance on the meaning of the claimed term "active packet", we find that an active packet is simply an "object communicated in an active network" (page 3, line 12). This definition of the term "active packet" is clearly rendered obvious by Draper's disclosure of the use of Java Sockets (i.e., node identifier in a network), CORBA (i.e., program that helps transfer messages to and from objects between various platforms in a distributed network environment), and the Internet for communication in a simulated UAV environment. "Active" networks simply allow the injection of user programs into the nodes of the network. This feature is further rendered obvious by Draper's disclosure of the use of JAVA (executable code) and multi-user interaction with the UAV simulation over the Internet (pp. 746, para: 2) and the use of autonomous agents (automatic) in controlling UAV scenarios (pp. 746, col. 2, para:1). Hence, in considering the language of the claims in light of the specification, the examiner finds no distinguishing description of the term "active packets" over the teachings of Draper.

Turning now to the recited "algorithmic" active packet, and again looking into applicant's specification, we find that an algorithmic active packet appears to simply be a representation of the optimal command sequence that has been compressed to minimum size and stored in a packet. (Specification: page 3, line 11, Yavnai teaches command sequence optimization as noted below) Looking further into the specification, we find that the claimed "encoding each selected command sequence" includes

compressing the command sequence according to any well-known data compression algorithm. (page 11, line 6) While applicants have denied that any portion of the specification contains an admission that the claimed subject matter is prior art, the examiner can only interpret the specifications recitation of "any well-known data compression algorithm" to mean the techniques were known to one of ordinary skill in the art at the time of the invention. (i.e. applicants are using one of an array of well-known data compression algorithms such as LZW, CCITT, Huffman, run-length, etc., to perform the claimed "encoding" of each selected command sequence) Applicant's argument that the specification recitation "specific knowledge of the data to be compressed allows a more efficient hypothesis to be developed" does not distinguish present invention over prior art compression algorithms as alleged by applicants. This recitation appears to merely make reference to the well-established fact that the compressibility of data (i.e. best compression ratio for any algorithm) is a function of the data to be compressed. (See: "Introduction to Information Theory and Data Compression", pp. 106, Section 5.3, for example) Namely, that the "best fit" of any compression algorithm, and one that yields the highest compression ratio, is dependent upon the nature of the data to be compressed. Applicants are invited to explain any novel aspects of the present inventions compression algorithms, above and beyond the referenced "well-known" data compression algorithms mentioned in the specification (page 11, line 6).

The examiner therefore submits that the claimed "encoding each selected command sequence into an algorithmic active packet", as defined by applicant's

specification, appears to simply require compressing data representing an command sequence (using any well-know data compression algorithm), into a algorithmic active packet consisting of a data portion and algorithmic portion. The specification indicates that data such as course information would be included in algorithmic portion, while data such as command to photograph would be included in the data portion (Specification: page 11, line 19). These features are therefore clearly rendered obvious by the combination of Yavnai's teaching of command sequence optimization (CL24-L17-67, CL22-L30-67) and Draper's teaching of communicating network objects in a simulated UAV environment (pp.746-747). Yavnai also teaches following mission plan (course) and commanding photographs (airphotos) (CL23-L1-4, Fig 4), while Draper further teaches flight path (course, pp. 747, col. 1, para: 2) and automated agent scenario control (pp. 746, col. 2, para:1).

In addition to the motivation to combine the references cited below, Draper provides further motivation by pointing out the "importance to condense" (i.e. compress) the enormous amount of information transmitted to a UAV. (pp. 744, col. 2, para: 1)

Turning to claim 8, applicants argue that the prior art does not disclose tracking a UAV in the performance of a pre-programmed mission. While claim 8 stands rejected under 35 USC 101 as not being concrete and tangible, the examiner notes that this limitation is rendered obvious at least by Draper clearly disclosing preprogrammed missions (course, pp. 747, col. 1, para: 2, Fig. 2), and the Yavnai teaching of UAV tracking (CL38-L10-20).

Regarding applicant's arguments relating to claims 4-5, and 7 (i.e. optimal mission outcome and the compressibility of the command sequence) the examiner submits that, as disclosed in applicant's specification (page 10, para: 2), the optimal compression of command sequences are derived according to the Minimum Data Length (MDL) theorem. The MDL theorem is clearly identified in the specification as work done by another (Wallace et al) and therefore qualifies as prior art.

MPEP 2129 recites the following supporting rational:

> *"DISCUSSION OF PRIOR ART IN SPECIFICATION*
> *Where the specification identifies work done by another as "prior art," the subject matter so identified is treated as admitted prior art. In re Nomiya, 509 F.2d 566, 571, 184 USPQ 607, 611 (CCPA 1975)"*

Accordingly, for the reasons set forth above and below under 103(a) rejections, the examiner maintains the 103(a) rejection of claims 1-8.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claim 8 is rejected under 35 U.S.C. 101 because the claimed invention is drawn to non-statutory subject matter.

Per independent claim 8: The Examiner further submits that, in view of the language of the claims, Applicant's have merely claimed a manipulation of abstract ideas by simulating UAV performance consisting of mathematical operations and have not recited a concrete and tangible result.

Section 2106 [R-2] (Patentable Subject Matter — Computer-Related Inventions) of the MPEP recites the following:

"In practical terms, claims define nonstatutory processes if they:
– consist solely of mathematical operations without some claimed practical application (i.e., executing a "mathematical algorithm"); or
*– **simply manipulate abstract ideas**, e.g., a bid (Schrader, 22 F.3d at 293-94, 30 USPQ2d at 1458-59) or a bubble hierarchy (Warmerdam, 33 F.3d at 1360, 31 USPQ2d at 1759), **without some claimed practical application**."*

*.."the mere fact that the claim may satisfy the utility requirement of 35 U.S.C. 101 does not mean that a useful result is achieved under the practical application requirement. The claimed invention as a whole **must produce a "useful, concrete and tangible"** result to have a practical application."*

In this case, independent claim 8 is simply drawn to the manipulation of abstract ideas by simulation of UAV performance (i.e. a mathematical operation), but does not recite a concrete and tangible result since the result appears to simply be an "estimation" that is based on a mathematical operation.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,122,572 issue to Yavnai in view of "An Architecture for Modeling Uninhabited Aerial Vehicles", Draper et al, IEEE 0-7803-5731-0/99, IEEE 1999.

Independent claim 1, for example, is drawn to:

Optimizing UAV command sequence by:
- simulating performance of UAV command sequence in simulated environment;
- modifying command sequence mission;
- simulating performance of modified command sequence by UAV in simulated environment, resulting in new mission outcome;
- repeating to optimize the simulated mission outcome;
- selecting sequences based in upon which command sequences produce optimal outcome;
- encoding each selected command sequence into algorithmic active packet.

Regarding independent claims 1 and 8: Yavnai teaches a system and method for the optimization (CL24-L17-67) of a command sequence for a UAV (CL22-L30-67) operating in a simulated environment (CL25-L9-29, Fig. 13). Yavnai further discloses modifying a mission command sequence (CL23-L29-67) and simulating the performance of the modified (new) command sequence and resulting simulated mission. (CL23-L53-61, Figs. 2-6) Yavnai also discloses selecting command sequences (CL6-45-67) that provide an optimal outcome (i.e. optimizing the command sequences) and following a mission plan (course) and commanding photographs (airphotos), CL23-L1-4, Fig 4).

Yavnai does not explicitly disclose encoding the selected (optimized) command sequence into an algorithmic active packet.

Draper teaches an architecture for modeling (simulating) UAV command control that includes communication of the command sequence and course information between a host (operator computer) and the UAV (Section 2, page 747, para: 2, page 746, col. 2, para: 1) That is, Draper clearly teaches is that it was known at the time of the invention to use state-of-the-art network technologies (Java Socket, CORBA, and the Internet, pp. 746, para: 2) for communication in a simulated UAV environment. It is well established that such network technologies communicate via data "packets". (See: "packet", Microsoft Computer Dictionary). Looking into applicant's specification for guidance on the meaning of the claimed term "active packet", we find that an active packet is simply an "<u>object communicated</u> in an active network" (page 3, line 12). This definition of the term "active packet" is clearly rendered obvious by Draper's disclosure of the use of Java Sockets (i.e., node identifier in a network), CORBA (i.e., program that helps transfer messages to and from <u>objects</u> between various platforms in a distributed network environment), and the <u>Internet</u> for communication in a simulated UAV environment. "Active" networks simply allow the injection of user programs into the nodes of the network. This feature is further rendered obvious by Draper's disclosure of the use of JAVA (executable code) and multi-user interaction with the UAV simulation over the Internet (pp. 746, para: 2) and the use of autonomous agents (automatic) in controlling UAV scenarios (pp. 746, col. 2, para:1). Applicant's specification defines an "algorithmic" active packet as a compressed file containing a data portion for commanding photographs, and an algorithmic portion containing UAV course information for uploading to the UAV. (page 11, 0025) Applicant's specification

indicates that the compression (i.e. encoding) techniques used to compress the command sequences in the active packet use any well-known data compression algorithm (page 11, 0024) and hence were known to one of ordinary skill in the art at the time of the invention. Draper further teaches flight path (course, pp. 747, col. 1, para: 2) and automated agent scenario control (pp. 746, col. 2, para:1) while Yavnai discloses following a mission plan and commanding photographs (airphotos, CL23-L1-4, Fig 4) as noted above.

It would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to modify the teachings of Yavnai relating to optimization of a command sequence for a UAV operating in a simulated environment, with the teachings of Draper relating to communication of the command sequence and course information between a host and the UAV, to realize the elements of the claimed invention. An obvious motivation exists since, in this case, the Yavnai reference teaches to the Draper reference, and the Draper reference teaches to the Yavnai reference. Specifically, both Yavnai and Draper teach UAV mission planning and command optimization and are used in the same technological arena as noted above. Yavnai teaches to Draper because Yavnai teaches techniques optimizing UAV command sequences (See: Yavnai, Summary of Invention). Draper teaches to Yavnai because Draper specifically teaches communicating the command sequences using standard communications links and protocols (i.e. packets). (See: Draper: pp. 744, col. 2, para: 1, "importance to condense" (i.e. compress) the enormous amount of information transmitted to a UAV. Further, the level of skill required by an artisan to

realize the claimed limitations of the present invention is clearly established by both references. (See: Yavnai/Draper, Background/Abstract) Accordingly, a skilled artisan having access to the teachings of Yavnai and Draper, would have knowingly modified the teachings of Yavnai with the teachings of Draper (or visa versa) to realize the claimed elements of the present invention while reducing the cost and development time.

<u>Per dependent claims 2 and 3</u>: Yavnai discloses the use of genetic algorithms and neural network techniques in developing UAV command sequences (CL25-L1-8) and mission objectives (CL7-L39).

<u>Per dependent claims 4, 5 and 7</u>: The examiner has interpreted the specifications recitation of "any well-known data compression algorithm" to mean the techniques were <u>known to one of ordinary skill in the art at the time of the invention</u> (page 11, 0024). As disclosed in applicant's specification (page 10, para: 2), the optimal compression of command sequences are derived according to the Minimum Data Length (MDL) theorem. The MDL theorem is clearly identified in the specification as work done by another (Wallace et al) and therefore qualifies as prior art.

<u>Per dependent claim 6</u>: Representing the commands as an algorithm supplemented by data is rendered obvious by the combination of Yavnai and Draper using the reasoning previously set forth above. That is, Draper specifically teaches that it is well known to use standard communications links and protocols (i.e. packets) in communication commands to UAV's that contain command sequences and course (algorithm) information. (Section 2, page 747, para: 2, page 746, col. 2, para: 1)

Conclusion

*5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).*

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

"Simulation as s Mission and Rehearsal Tool", W. M. Garrabrants, Proceedings 1998 Winter Simulation Conference, ACM 1998.

U.S. Patent 6,056,237 issued to Woodland teaches a UAV system and command simulation.

U.S. Patent Application 2005/0119828 issued to Lahn teaches UAV mission planning and mapping.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred Ferris whose telephone number is 571-272-3778 and whose normal working hours are 8:30am to 5:00pm Monday to Friday. Any inquiry of a general nature relating to the status of this application should be directed to the group receptionist whose telephone number is 571-272-3700. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jean Homere can be reached at 571-272-3780. The Official Fax Number is: (703) 872-9306

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